HYDROACOUSTIC MODEL VALIDATION AND THE SITE CALIBRATION EXPERIMENT AT ASCENSION ISLAND

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ABSTRACT

The ability of any given hydrophone of a monitoring station to successfully detect a Comprehensive Nuclear-Test-Ban Treaty violation will depend to a large extent on the acoustics of two different scales; global and local. At global distances, acoustic propagation within the ocean sound channel is dominated by the effects of acoustic modal refraction/reflection from variances in the oceanic sound channel, i.e., environmental effects on the local sound speed. On smaller scales, in particular close to the receiver, the local geo-acoustic environment will ultimately determine whether a propagation path between source and receiver exists: However, quite often this type of environmental data is not known to the precision and/or detail necessary to calculate accurate acoustic blockage charts. Further complicating matters is the deep sediment penetration of the relatively low-frequency (10 Hz) content of probable source characteristics. We address the problems and their ramifications in site calibration studies caused by the limitations of the environmental databases. As a specific case we consider the acoustic blockage for the hydrophones in the vicinity of Ascension Island that are to be used as the basis of one of the International Data Centre's monitoring sites. A regional/local acoustic propagation model that appropriately accounts for local variations in the environment is employed in this investigation to calibrate each hydrophone as a function of frequency and azimuth. This model is then compared to a representative sample of the data collected from the recent calibration experiment conducted near Ascension Island.

Key Words: hydroacoustic monitoring, hydrophone, acoustics